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EFFECTS OF DIRECT INSTRUCTION ON THE ACQUISITION OF PREPOSITIONS BY STUDENTS WITH INTELLECTUAL DISABILITIES

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Some students with intellectual disabilities require explicit instruction of language skills, including preposition use; however, little is known about effective ways to teach preposition use to this population. This study examined direct instruction (DI) to teach students to use and respond to prepositions. Results indicated that DI was an effective way to teach prepositions. Limitations and directions for future research are discussed.

Key words: direct instruction, developmental disabilities, language

Language delays or impairments are common among students with intellectual disabilities (Westling & Fox, 2000). Language includes nonvocal expressions (e.g., pointing to a ball to ask for a ball) and vocal expressions (e.g., saying "ball, please"). Many students with intellectual disabilities have difficulty acquiring a large vocal repertoire (Gargiulo, 2009). Some students with language delays acquire language skills (e.g., mands and tacts) incidentally; however, other students require explicit instruction in these skills (Ganz & Flores, 2009).

Preposition use is an objective integrated into English language arts curricula in early elementary grades because this skill is critical to using and responding to spoken and written language (Branigan, Pickering, & McLean, 2005). Prior research on teaching prepositions has included evaluations of prompting, reinforcement, and precision teaching. Frisch and Schumaker (1974) used verbal and physical prompts and reinforcement to teach prepositions (e.g., placing an object next to, under, or on top of another object) to students with intellectual disabilities. Lee (1981) used praise and tokens to teach students with moderate intellectual disabilities and limited speech to use prepositions when stating the location (e.g., "on the right," "on the left") of common objects. King, Moors, and Fabrizio (2003) used precision teaching to teach a child with autism to respond with and to prepositions and a range of objects and object placement. The procedures used in these studies increased students' preposition use or comprehension.

Despite these positive findings, there is a paucity of research on effective instructional methods for teaching prepositions to students with intellectual disabilities. Direct instruction (DI) is explicit, systematic, and scripted instruction designed to maximize teacher efficiency and effectiveness (Engelmann & Carnine, 1991; Marchand-Martella, Slocum, & Martella, 2004). DI is a well-researched model that has been effective for students with diverse learning needs (e.g., Adams & Engelmann, 1996; Kinder, Kubina, & Marchand-Martella, 2005; Przychodzin-Havis et al., 2005), but the use of DI to teach preposition use to students with intellectual disabilities has yet to be examined. Therefore, the purpose of this study was to

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investigate the effects of DI on students' acquisition, maintenance, and generalization of using and responding to prepositions.

METHOD

Participants and Setting

Paul and William were two 14-year-old African-American boys enrolled in a self-contained middle-school classroom in North Carolina. They had been diagnosed with multiple disabilities and had sufficient verbal skills to communicate their basic needs. Each met the following inclusion criteria: (a) intellectual disability, (b) ability to vocally name common objects (e.g., pencil), and (c) inability to respond accurately to verbal instructions that included positional prepositions. The intervention and probes were implemented in a small room adjoining the classroom. Sessions, conducted once per day, included a probe prior to instruction and lasted approximately 15 min.

Procedure

An initial assessment conducted prior to baseline served to identify nouns and target prepositions for each participant. In this assessment, participants were required to name each of the 12 objects to be used during instructional sessions and probes to ensure proficiency in naming those objects. Baseline probes followed the assessment in the absence of instruction.

Probes. Probes were conducted once per day in baseline, at the beginning of each daily teaching session during DI, and once per day during a subsequent maintenance phase. In each probe, Paul received 16 probe trials that targeted four prepositions, and William received 12 probe trials that targeted three prepositions. Two receptive and two expressive trials were conducted for each preposition. In expressive trials, the experimenter showed the participant an object that was placed in relation to another object (e.g., a ball beside a book) then asked, "Where is it?" A correct response was defined as a vocalization that included the target preposition and a noun that was the object of the prepositional phrase (e.g., "The ball is beside the book" or "beside book"). In receptive trials (i.e., responding to prepositions), the experimenter gave the participant a verbal instruction that included a preposition (e.g., "Put the ball between the books") and presented the relevant objects. A correct response consisted of positioning the objects as instructed. Each student's target prepositions were presented in random order in each probe, using various objects from the set of 12 used during instruction. No consequences were provided for correct or incorrect responses during probes.

Direct instruction. Instruction consisted of four phases for each preposition. In each phase, DI was conducted using Engelmann and Carnine's (1991) instructional sequence for teaching concepts and a script developed by the investigators. In Phase 1, the experimenter used a model–test instructional procedure to teach prepositions (e.g., *on*) using two objects. The experimenter modeled five examples and nonexamples and then tested the participant on seven different examples and nonexamples. To demonstrate the preposition *on,* the experimenter placed the ball on top of the box in the middle and said, "this is on." To demonstrate a nonexample, the experimenter placed the ball at least one foot away from the box and said, "this is not on." The experimenter varied the positions of the ball on the box and not on the box to cover a range of possibilities. This demonstration of the concept (i.e., prepositions) allowed students to see examples and nonexamples of the concept prior to being asked to respond. To test participants after modeling the examples and nonexamples, the experimenter positioned the ball on and around the box and asked, "Where is the ball?" In this phase, responses were defined as correct if the students responded either "on" or "not on" to the appropriate stimulus. The experimenter

delivered praise for all correct responses and verbally prompted a correct response after each incorrect response. No receptive trials were conducted during the model–test procedure until Phase 4. In Phase 1 and in subsequent phases, the participant continued to receive instruction until he responded correctly to the last three items during testing. At this point, the participant moved to the next phase.

In Phase 2, the experimenter followed the same script to model and test examples and nonexamples but presented the nonexamples less than four inches from the object identified by the noun (e.g., ball held 1 in. off the table). A second change for this phase was that during testing, the participants were required to respond to "Where is the ball?" with a preposition paired with a noun (e.g., "on table"). Correct responses in this phase through Phase 4 were defined as a vocalization that included the target preposition and a noun that was the object of the prepositional phrase.

In Phase 3, the model–test instructional procedures were the same as in previous phases, but the instructional objects were replaced with common classroom objects (e.g., pencil, book) during testing. In Phase 4, instructions and materials were the same as in previous phases, and students were required to respond to a verbal prompt to demonstrate comprehension of the prepositions (e.g., "Put the pencil on the book"). A correct response consisted of positioning the objects as instructed. After three consecutive presession probes at 100% accuracy, instruction on that preposition was discontinued and another preposition was introduced.

Generalization. Generalization data were collected during two activities. In the first, the experimenter read aloud three different, adapted, age-appropriate stories. Students answered literal recall questions (e.g., "Where did Roberto hit the baseball?") and were required to point to the correct pictorial representation of that scene from an array of four (e.g., over the fence, against the fence, over the tree, under the tree). In the second activity, a scavenger hunt, students were instructed to hide items by following a verbal prompt that included a preposition and then provided vocal clues (e.g., "between the plants") using target prepositions to help the second observer find the items.

Data Collection and Interobserver Agreement

Data were collected on a trial-by-trial basis during probes, instructional sessions, and generalization activities using preprinted data sheets. A response was scored as correct when it met the definition of a correct response in the absence of prompting. During generalization activities, functionally equivalent prepositions (e.g., *under* for *beneath*) and self-corrections were scored separately from correct and incorrect responses. During 31% of Paul's sessions and 38% of William's sessions, a second observer collected procedural fidelity data on the experimenter's instruction and interobserver agreement data on student responses to probes. The data records were compared on a trial-by-trial basis. Interobserver agreement was calculated by dividing the number of trials with agreement by the sum of agreements and disagreements, and multiplying by 100%. Interobserver agreement averaged 99%, and the experimenter completed all steps of the intervention in observed sessions with 100% accuracy. Social validity data were collected from four teachers who were enrolled in a severe disabilities teacher education program. A short presentation of the study and results was given to the group, and they responded to a brief questionnaire in which they indicated that DI was an appropriate and efficient way to teach prepositions.

RESULTS AND DISCUSSION

The cumulative number of correct responses across prepositions in the daily probes for the two participants is shown in Figure 1. These data indicate a functional relation between DI and the students' use of and response to

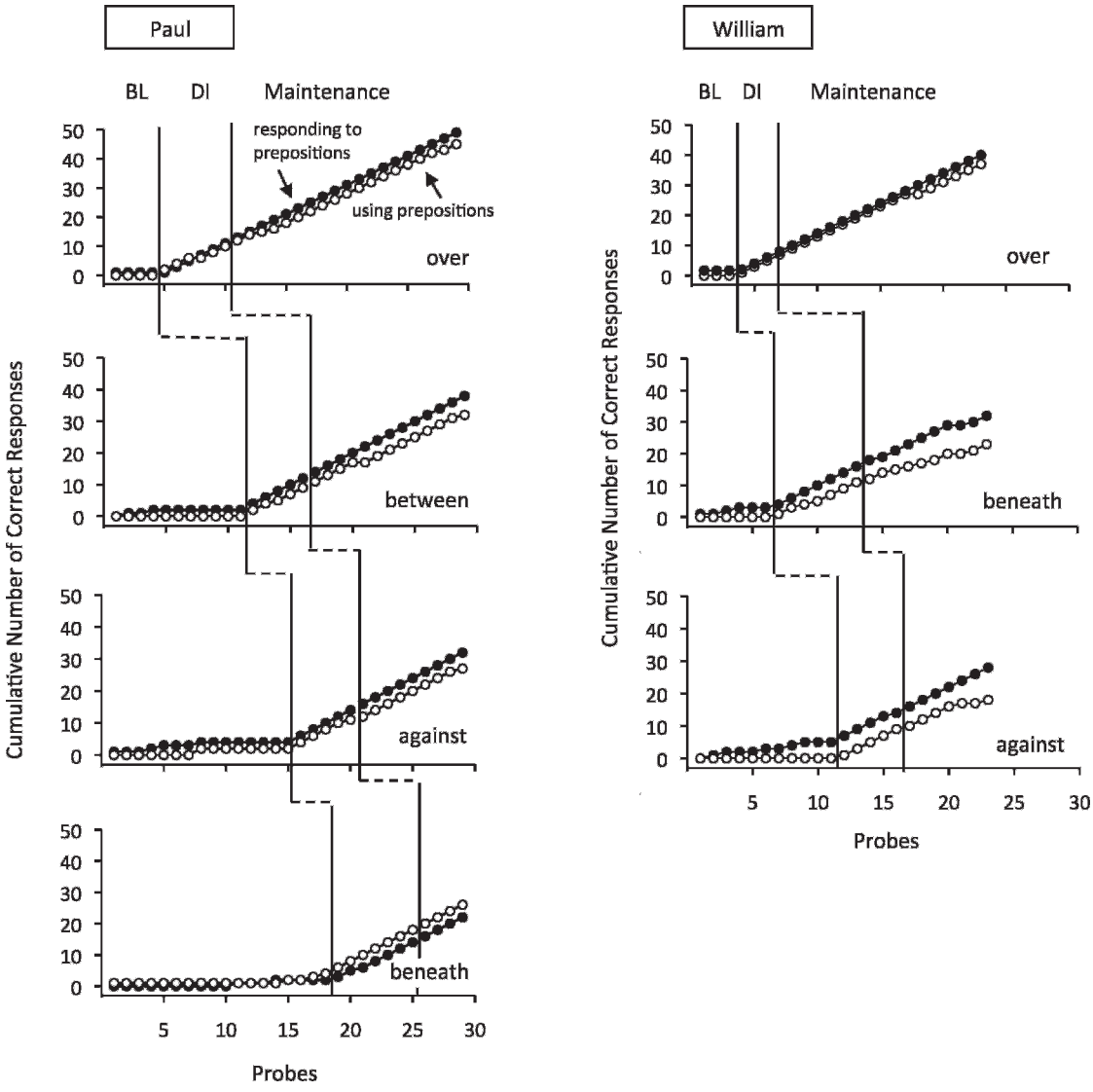

Figure 1. Cumulative number of correct responses across prepositions for Paul and William. During each probe, students had two opportunities to respond to each preposition and two opportunities to use each preposition. BL = baseline; DI = direct instruction.

prepositions. During the DI phase, the data paths for all prepositions for both participants showed a steep increase, indicating rapid acquisition of prepositions. Participants required an average of 1.3 sessions in each phase to meet the mastery criterion. Performance during the maintenance phase, when participants received no further instruction, was similar to performance during the DI phase.

The adapted books and the scavenger hunt activities were used to conduct generalization posttest probes. In the adapted book activities, Paul responded correctly in seven of the eight trials, and William responded correctly in five of the six trials. In the scavenger hunt, both participants' performance was variable, with few correct responses. Of Paul's answers, there were two correct responses, two functionally equivalent

prepositions, two self-corrections, and one incorrect response. William gave one correct response, four functionally equivalent prepositions, and one self-corrected response. Despite the positive results from the adapted book activity, the extent to which generalization occurred is not clear because no pretest probes were conducted before instruction. Future studies should measure generalization throughout the study to determine the extent to which participants are able to perform the tasks before, during, and after intervention. Ways to promote generalization also may need to be investigated further.

Another limitation of the study is that instruction was delivered in a one-on-one format, whereas DI is typically delivered in small groups. Future studies should investigate small-group DI for teaching prepositions to students with intellectual disabilities.

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